FINAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Water Resource Management, Bureau of Watershed Management

SOUTHWEST DISTRICT • TAMPA BAY TRIBUTARIES

TMDL Report

Fecal Coliform and Total Coliform TMDL for Wares Creek

(WBID 1848C)

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Web sites

Florida Department of Environmental Protection, Bureau of Watershed Management

TMDL Program

http://www.dep.state.fl.us/water/tmdl/index.htm

Identification of Impaired Surface Waters Rule

http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf

STORET Program

http://www.dep.state.fl.us/water/storet/index.htm

2002 305(b) Report

http://www.dep.state.fl.us/water/docs/2002_305b.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/water/tmdl/stat_rep.htm

Allocation Technical Advisory Committee (ATAC) Report

http://www.dep.state.fl.us/water/tmdl/docs/Allocation.pdf

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

http://www.epa.gov/region4/water/tmdl/florida/

National STORET Program

http://www.epa.gov/storet/

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for fecal and total coliform for Wares Creek in the Manatee River Basin. The creek was verified as impaired for fecal and total coliform, and was included on the Verified List of impaired waters for the Manatee River Basin that was adopted by Secretarial Order on May 27, 2004. The TMDL establishes the allowable loadings to the Wares Creek that would restore the waterbody so that it meets its applicable water quality criterion for fecal and total coliform.

1.2 Identification of Waterbody

Wares Creek, located in Manatee County, is a small tributary to the Manatee River, which is a tributary to the lower portion of Tampa Bay, near the city of Bradenton **(Figure 1.1).** The creek is a high-banked meandering stream that is about 4.45 miles long, extending from 20th St. to the Manatee River,and has a total drainage area at the mouth to the Manatee River of 6.833 square miles. Major centers of population in the basin include Bradenton, a city of about 50,000 at the southwest end of the Manatee River Basin. Wares Creek is a first-order, stream, and along its length exhibits characteristics associated with riverine aquatic environments. Additional information about the river's hydrology and geology are available in the Basin Status Report for the Tampa Bay Tributaries Basin (Florida Department of Environmental Protection, 2002) and the Environmental Assessment (COE, 1994) for Cedar Hammock (Wares Creek).

For assessment purposes, the Florida Department of Environmental Protection (the Department) has divided the Manatee River Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. Wares Creek has been assigned WBID 1848C, as shown in **Figure 1.2.** On some maps Wares Creek is also known as the East Branch of Cedar Hammock Creek.

Figure 1.1. Location of Wares Creek and Major Geopolitical Features in the Manatee River Basin

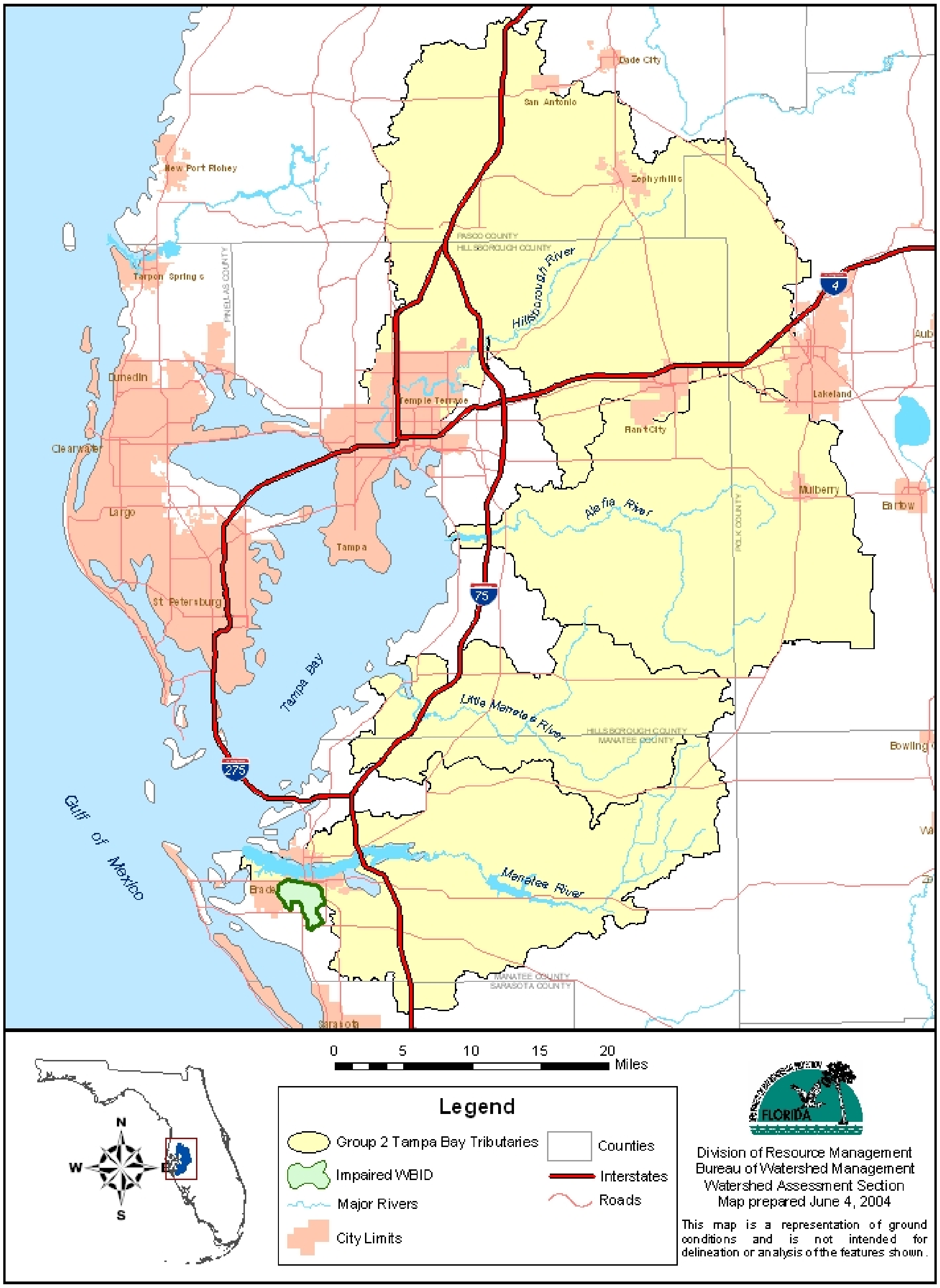
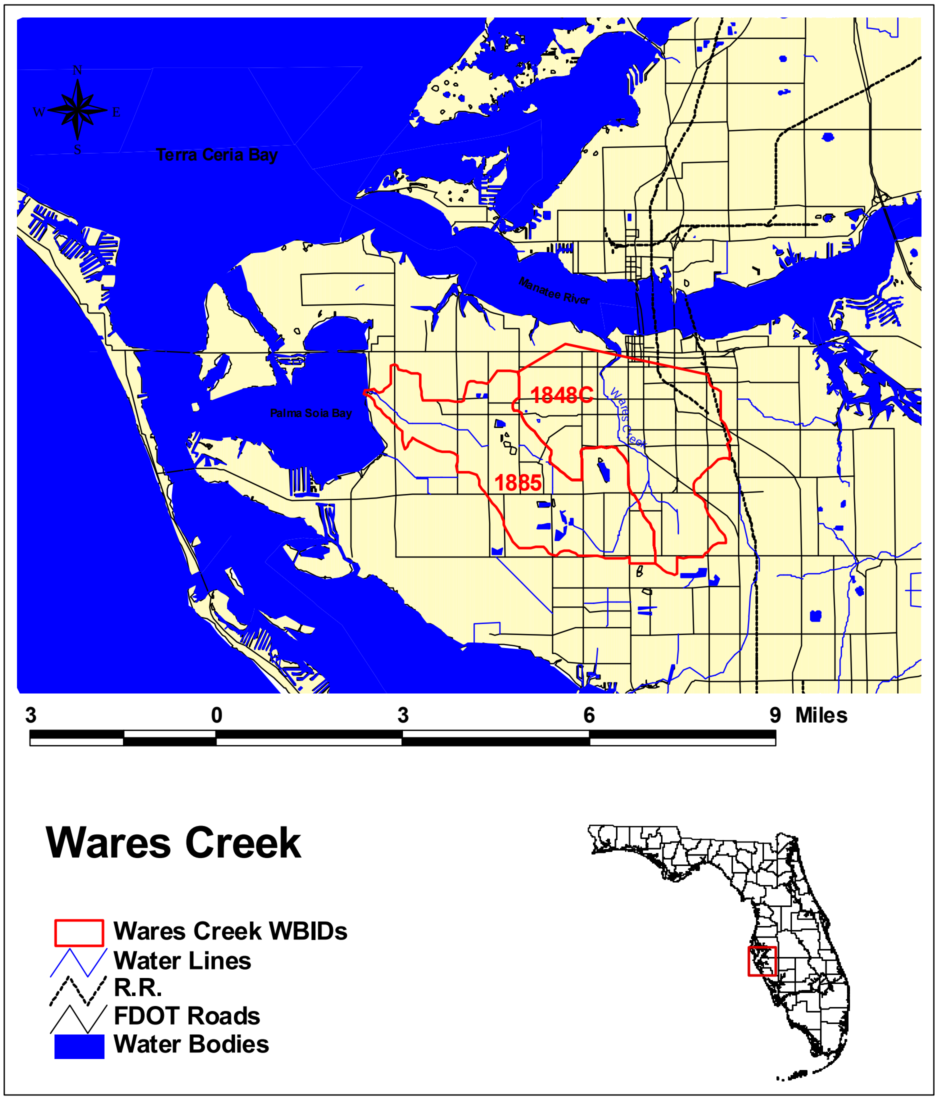


Figure 1.2. WBIDs in the Wares Creek Basin



1.3 Background

This report was developed as part of the Department's watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's 52 river basins over a 5-year cycle, provides a framework for implementing the TMDL Program–related requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA, Chapter 99-223, Laws of Florida).

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. TMDLs provide important water quality restoration goals that will guide restoration activities.

This TMDL Report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of fecal coliform that caused the verified impairment of Wares Creek. These activities will depend heavily on the active participation of the Southwest Florida Water Management District, local governments, businesses, and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act requires states to submit to the EPA a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing the impairment in each of these waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4)] Florida Statutes [F.S.]), and the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included 10 waterbodies in the Manatee River Basin, however, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rule-making process, the Environmental Regulation Commission adopted the new methodology as Chapter 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in Wares Creek and verified the impairments for fecal and total coliform (**Table 2.1)**. The fecal and total coliform impairment has been verified with recently obtained data. Some of these data are included in **Appendix G. Table 2.2** provides assessment results for fecal and total coliform for each waterbody segment during the verification period. As shown in Table 2.2,there were 8 fecal coliform exceedences of 22 samples (36 % exceedances) and 6 total coliform exceedences of 22 samples (27% exceedances). Fecal coliform values ranged up to 4,500 colonies/100 mL, while total coliform values ranged up to 4,700 colonies/100 mL.

Table 2.1. Verified Impaired Segments in the Wares Creek Basin

WBID	Parameters of Concern	Priority for TMDL Development	Projected Year for TMDL Development
1848C	FECAL COLIFORM	HIGH	2003
1848C	TOTAL COLIFORM	HIGH	2003

Note: The parameters listed in **Table 2.1** provide a complete picture of the impairment in the river.

Table 2.2. Fecal Coliform and Total Coliform Data

Station Number	Data Provider	Date	Fecal Coliform (N/100mL)	Total Coliform (N/100mL)
21FLTPA 27275228234117	FDEP	3/27/2002	90	350
21FLTPA 27275228234117	FDEP	4/10/2002	60	210
21FLTPA 27275228234117	FDEP	5/22/2002	370	670
21FLTPA 27275228234117	FDEP	5/29/2002	250	1000
21FLTPA 27275228234117	FDEP	7/16/2002	**500**	1440
21FLTPA 27275228234117	FDEP	8/12/2002	**1230**	**4200**
21FLTPA 27275228234117	FDEP	10/14/2002	100	250
21FLTPA 27275228234117	FDEP	10/22/2002	1	380
21FLTPA 27285228234395	FDEP	3/27/2002	330	1140
21FLTPA 27285228234395	FDEP	4/10/2002	300	390
21FLTPA 27285228234395	FDEP	5/22/2002	275	**3800**
21FLTPA 27285228234395	FDEP	5/29/2002	210	920
21FLTPA 27285228234395	FDEP	7/16/2002	**840**	**3000**
21FLTPA 27285228234395	FDEP	8/12/2002	**1300**	**4700**
21FLTPA 27285228234395	FDEP	10/14/2002	155	580
21FLTPA 27285228234395	FDEP	10/22/2002	150	**3000**
21FLTPA 272930218234533	FDEP	5/22/2002	**4500**	1
21FLTPA 272930218234533	FDEP	5/29/2002	**1060**	1580
21FLTPA 272930218234533	FDEP	7/16/2002	**2800**	**3600**
21FLTPA 272930218234533	FDEP	8/12/2002	10	5
21FLTPA 272930218234533	FDEP	10/14/2002	**1020**	5
21FLTPA 272930218234533	FDEP	10/22/2002	310	1650

Note: Numbers in **bold** exceed the criteria (400 N/100mL for Fecal Coliform, 2400 N/100mL for Total Coliform).

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

Class I	**Potable water supplies**
Class II	**Shellfish propagation or harvesting**
Class III	**Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife**
Class IV	**Agricultural water supplies**
Class V	**Navigation, utility, and industrial use (there are no state waters currently in this class)**

Wares Creek is a Class III waterbody, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the impairment addressed by this TMDL are for fecal coliform and total coliform.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

Numeric criteria for bacterial quality are expressed in terms of fecal coliform bacteria and total coliform bacteria concentrations. The water quality criteria for the protection of Class III waters, as established by Chapter 62-302, F.A.C., states the following:

> ***Fecal Coliform Bacteria:***
> *The most probable number (MPN) or membrane filter (MF) counts per 100 ml of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day.*
>
> ***Total Coliform Bacteria:***
> *The MPN per 100 ml shall be less than or equal to 1,000 as a monthly average nor exceed 1,000 in more than 20 percent of the samples examined during any month; and less than or equal to 2,400 at any time.*

For both parameters, the criteria state that monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period. During the development of load curves for the impaired streams (as described in subsequent chapters), there were insufficient data (fewer than 10 samples in a given month) available to evaluate the geometric mean criterion for either fecal coliform or total coliform bacteria. Therefore, the criterion selected for the fecal coliform TMDL was not to exceed 400 in 10 percent of the samples and the total coliform TMDL was not to exceed 2400 at any time.

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of the pollutant of concern in the watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "nonpoint sources." Historically, the term point sources has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term "nonpoint sources" was used to describe intermittent, rainfall driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under the EPA's National Pollutant Discharge Elimination (NPDES) Program. These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1**). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Potential Sources of Fecal Coliform in the Wares Creek Watershed

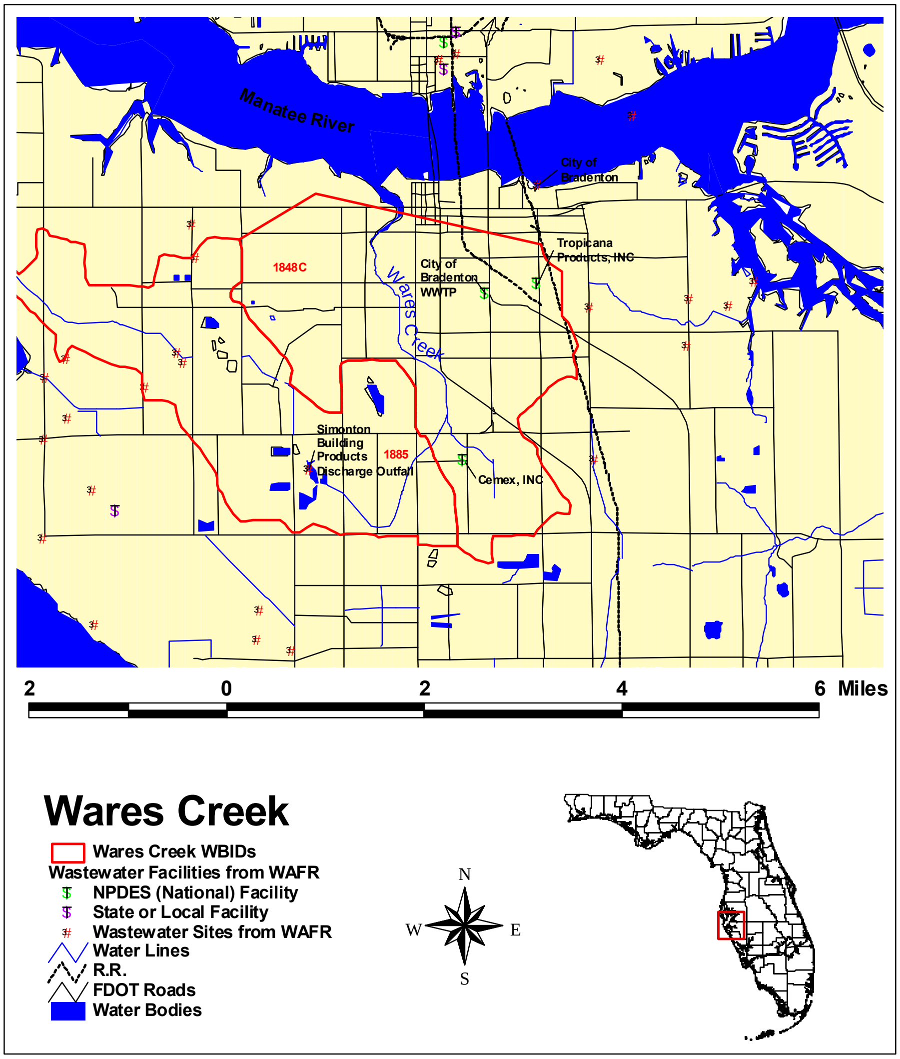
4.2.1 Point Sources

There are no wastewater treatment facilities authorized to discharge to Wares Creek or in the Wares Creek watershed. However, there are two permitted wastewater treatment facilities that discharge to the Manatee River near Wares Creek (DEP, 1979; Palmer, 1980; Degrove,1984; Degrove, 1986) **(Appendix C)** and their discharge may reach Wares Creek during high tide**.** The two facilities are the City of Bradenton's domestic WWTF and Tropicana Products, Inc., a citrus processing plant. Effluent from both facilities is discharged into the Manatee River east of US 41 and downstream of the Braden River **(Figure 4.1).**

The Bradenton WWTF has a design capacity of 9.0 million gallons per day (MGD) (FDEP, 2002). According to the Department's monitoring records, the average monthly flow for 2003 was 5.683 MGD. The Tropicana facility has a design flow of 0.6 MGD. **Appendix E** also provides flow data from the facility from Department records.

A list of major dischargers in the Manatee River Basin is included in **Appendix C**.

Figure 4.1. Wastewater Facilities in the Wares Creek Watershed



Municipal Separate Storm Sewer System Permittees

The stormwater collection systems owned and operated by the City of Bradenton are currently covered by a Municipal Separate Storm Sewer Systems (MS4) permit (FLS000037) (COB, 2000). Manatee County (permit FLS000036) also operates an MS4 system, some of which also intersects the Wares Creek Basin.

4.2.2 Land Uses and Nonpoint Sources

Additional fecal and total coliform loadings to Wares Creek are generated from nonpoint sources in the watershed. Potential nonpoint sources of coliforms include loadings from surface runoff, wildlife, livestock, pets, leaking septic tanks and sewer lines, marinas, houseboats and other watercraft. Ground water data (Appendix H) for the Manatee River Basin do not show any exceedances for fecal coliform (400/100 ml) in the aquifers.

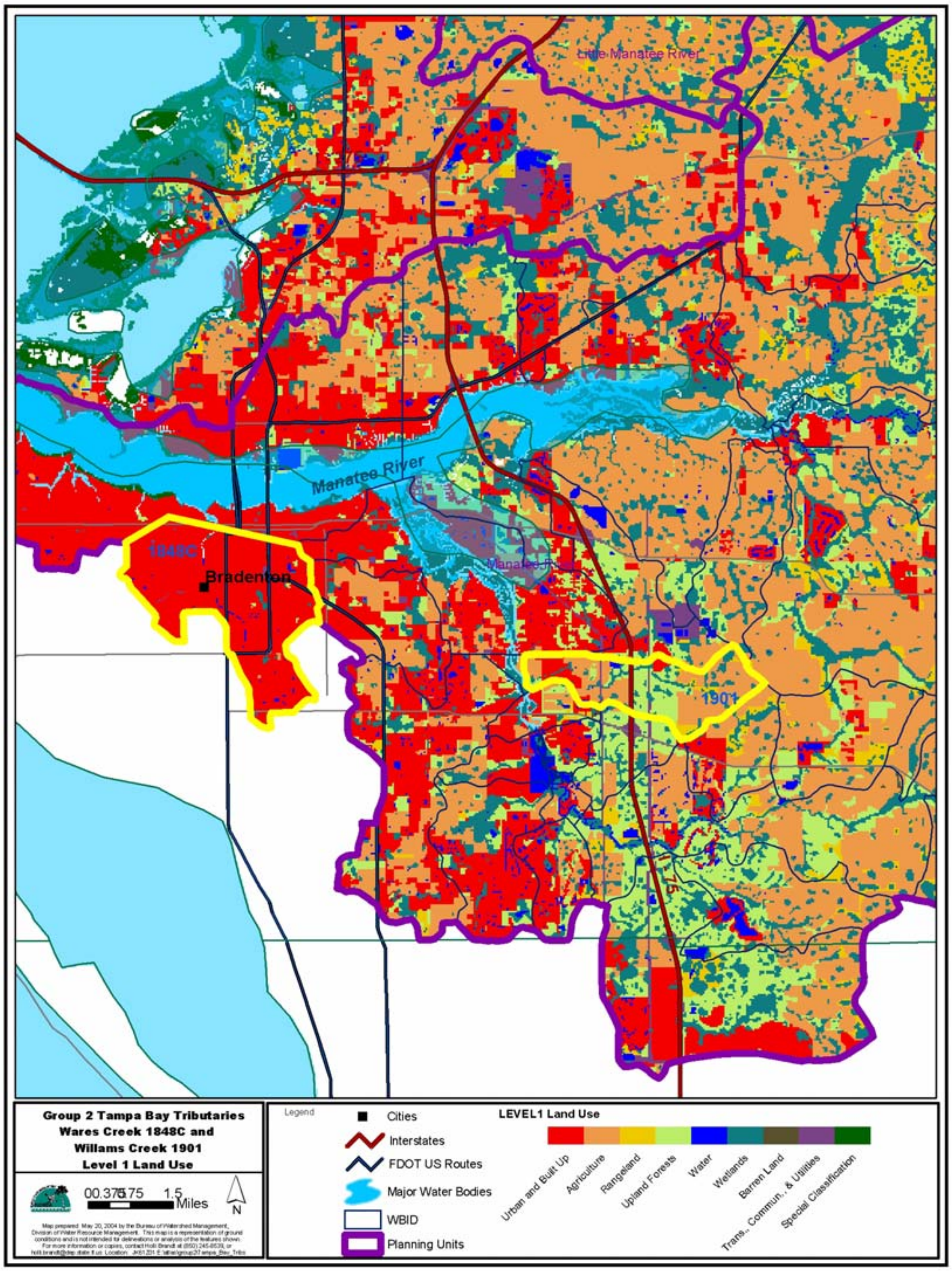
Land Uses

The spatial distribution and acreage of different land use categories were identified using the 1999 land use coverage (scale 1:40,000) contained in the Department's geographic information system (GIS) library. Land use categories in the watershed were aggregated using the simplified Level 1 codes tabulated in **Table 4.2.** **Figure 4.2** shows the acreage of the principal land uses in the watershed. Most of the land is Urban and Built Up (95.3%), with a very small amount in the other Level 1 categories. A detailed summary of various land use loads by category is included in **Appendix B**.

Table 4.2. Classification of Land Use Categories in the Wares Creek Watershed, WBID 1848C at Mouth

Code	Land Use	Acreage	Square Miles
1000	Urban and Built-Up	4165.9	6.509
2000	Agriculture	6.9	0.011
3000	Rangeland	0	0
4000	Upland Forests	19.9	0.031
5000	Water	42.9071	0.067
6000	Wetlands	32.2	0.050
7000	Barren Land	0	0
8000	Transportation, Communications	105.3	0.165
Total		4373.2	6.833

Figure 4.2. Principal Land Uses in the Wares Creek Watershed



Population

According to the U.S Census Bureau (2004), the population density in and around WBID 1848C in 2000 was about 356.3 people per square mile. The Bureau reports that the total population in Manatee County, which includes WBID 1848C, was 264,002 with 138,128 housing units. For all of Manatee County, the Bureau reported a housing density of 356.3 houses per square mile. This places Manatee County among the highest in housing densities in Florida (U.S. Census Bureau Web site, 2004). This is also supported by the land use, where 95.3 percent of the land use in WBID 1848C is dedicated to residences (Level 1 Urban and Built Up category).

Septic Tanks

Approximately 89.2 percent of the residences in the county are connected to the wastewater treatment plant, with the rest utilizing septic tanks (U.S. Census 1990). As of 2001, the Florida Department of Health (FDOH) reported that there were 38,482 permitted septic tanks in Manatee County (Florida Department of Health Web site, 2004). From fiscal years 1991 – 2002, 784 permits for repairs were issued, with no permits issued for repair in fiscal year 1993 (Florida Department of Health Web site, 2004).

WBID 1848C comprises 6.833 square miles, or approximately 0.922 percent of the land area of Manatee County (741.43 square miles). To estimate the number of septic tanks in WBID 1848C, we used the ratio of square miles of Level 1 land use category "Urban and Built Up" in the WBID to the square miles of Level 1 "Urban Built Up" for Manatee County, as shown in **Appendix B**. This translates to about 2,382 septic tanks for the entire WBID 1848C.

Between 1991 and 2002, an average of 78.4 permits were issued per year in the county for septic tank repairs. This number is about 0.204 percent of the total at any time. Previous studies (CDM, 1998) have shown that failed septic tanks are not discovered for about 5 years. This means that the true failure rate at any time is approximately five times the repair rate of 0.204 percent, or 1.02 percent. As a margin of safety (MOS), the Department assumed the failure rate was twice that, or 2.0 percent of the total septic tanks within each WBID. Using these numbers (Florida Department of Health Web site, 2004) and 70 gallons/day/person (U.S. Environmental Protection Agency, 2001), a loading of 3.28E11 colonies/day was estimated for failed septic tanks in the entire WBID 1848C watershed.

Table 4.3. Estimation of Coliform Loading from Failed Septic Tanks in the Wares Creek Watershed

Estimated Population Density and Area	Estimated Number of Septic Tanks in Area	Estimated Number of Tank Failures	Estimated Concentration From Failed Tank (cfu/100mL)	Gallons/ Person/ Day	Estimated Number of People Per Household	Estimated Load From Failing Tanks (cfu/day)
Based on estimate of people in the 6.509 square-mile area of urban/built-up land in Wares Creek, WBID 1848C	2,382	47.6	1.0E6	70	2.6	3.28E11

Livestock and Wildlife

Animal fecal matter, whether from livestock or wildlife, can be a significant source of coliform loadings to streams, depending on the number of animals, their location relative to the stream, and the best management practices (BMPs) used at individual agricultural operations. **Table 4.4** summarizes the estimated average daily fecal coliform loadings from 1990 through 2002, based on the numbers of livestock, wildlife, and domestic pets in the Wares Creek watershed (**Appendix B** contains a more detailed listing). It should be noted that the loadings shown in **Table 4.4** are total loadings to the land in the creek watershed, and this total load would not be expected to reach the creek (due to decay processes on land). The estimated delivery ratio of coliform to the creek is about 17.4% (Wanielista, 1997).

The numbers of each kind of livestock (USDA, 2003) assigned to each WBID in the county is based on the ratio of (Level 1 agriculture in the WBID/Level 1 agriculture in the county) times the number of livestock in the county. The number of wildlife assigned to each WBID is based on the wildlife densities from Franklin County (Shields, 2001) and the sum of square miles of "natural areas" (nonurban, nontransportation Level 1 land uses). The domestic pets (dogs, cats, ponies) are assigned based on the number of households in each WBID (USVA, 2004).

4.4 External Loadings to Wares Creek from Downstream Waters Due to Tidal Action

External loadings to Wares Creek from the Manatee River (WBID 1848A) due to tidal flow were also estimated (see **Appendix D**). Because the lower one mile of Wares Creek is tidally affected by the Manatee River, measured values could not be directly used to calculate loads for this portion of the river, and an estimate was made of this loading using the tidal prism approach (Thomann, 1987; Mills, 1985; and Pritchard, 1969). During a given day, there are either two high and two low tides (semidiurnal) or one high and one low tide (diurnal). If we assume a two-layer flow for the tidal portion of Wares Creek, then for about 12 hours per day, flow from the Manatee River enters the lower layer of Wares Creek, while the creek flow continues downstream. A rough estimate of this lower layer flow is the tidal prism or wedge volume divided by the 12-hour time of flooding. **Appendix D** shows an estimate of the tidal prism and flow at the mouth of Wares Creek. The average of the seasonal median fecal coliform concentrations (226.27 cfu/100 ml) for WBID 1848A and tidal flow calculated above (6.111 cfs) were used to estimate the fecal coliform load (3.3831E10 cfu/day). Similarly, the total coliform concentration (873.2 cfu/100ml) and total coliform load (1.3056E11 cfu/day) were also calculated.

Table 4.4. Average Daily Quantity of Internal Fecal Coliform Loading into Wares Creek –see Appendix B for complete table.*

Nonpoint Source Category	WBID 1848C, Wares Creek at Mouth	WBID 1848C, Wares Creek at Mouth	Manatee County
	Fecal Coliform Load (CFU/day)	Fecal Coliform Percent of Total Load in WBID 1848C	Fecal Coliform Load (CFU/day)
Livestock	1.3753E11	0.244	6.7989E15
Wildlife	1.2514E11	0.222	4.9268E14
Domestic Animals	5.3184E13	94.296	8.5929E14
Septic	2.9546E12	0.524	4.7737E13
TOTAL	**5.6401E13**	**100.00**	**8.1986E15**

* Table is summary of all nonpoint source categories in Appendix B.

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The methodology (Davis, 2004) used for this TMDL is the "load duration curve." Also known as the "Kansas Approach" because it was developed by the state of Kansas (Stiles, 2003), this method has been well documented in the literature (Cleland, 2002, 2003), with improved modifications used by EPA Region 4 (Davis, 2004). The method relates the pollutant concentration to the flow of the stream to establish the existing loading and the allowable pollutant load (TMDL) under a spectrum of flow conditions, and then determines the maximum allowable pollutant load and load reduction requirement based on the analysis of the critical flow condition. Using this method, it takes four steps to develop the TMDL and establish the required load reduction:

1. Develop the flow duration curve,
2. Develop the load duration curve for both the allowable load and existing loading,
3. Identify the five zones of flow on the duration curves (high, 0-10; moist, 10-40; mid-range, 40-60; dry, 60-90; low, 90-100) and define the critical condition(s), and
4. Establish the needed load reduction by comparing the existing loading with the allowable load under critical conditions (in this case, the 10^{th} to 50^{th} percentile flows were used).

5.2 Data Used in the Determination of the TMDL

There are 3 sampling stations in **WBID 1848C** that have historical coliform observations for **Wares Creek (Figure 5.1).** The primary data collector of historical data was the FDEP Tampa District Office. These sites were sampled from March 27, 2002, through October 22, 2002. A brief statistical overview of the observed data at these sites is provided in Table 5.1, and the data are provided in Appendix G. As shown in **Figure 5.2,** which plots the observed historical data over time, the greatest exceedances were on May 22, 2002, which is one of the lowest flows in the period of record.

In general, the creek distribution of fecal values is slightly higher near the mouth, represented by Sta. 34533 (refer to the green triangles in Figure 5.2); consequently, the TMDL will be applied to the entire WBID 1848C.

Table 5.1. Statistical Table of Data for Wares Creek, WBID 1848C

Parameter	WBID	Total Number of Samples	Geometric Mean of Coliform (N/100mL)	No. of Samples >400/>2400 (N/100mL)	Minimum Concentration (N/100mL)	Maximum Concentration (N/100mL)
Fecal Coliform	1848C	22	263.9888172	8	1	4500
Total Coliform	1848C	22	501.3651066	6	1	4700

Figure 5.1. Historical Monitoring Sites in Wares Creek, WBID 1848C

Wares Creek - WBID 1848C

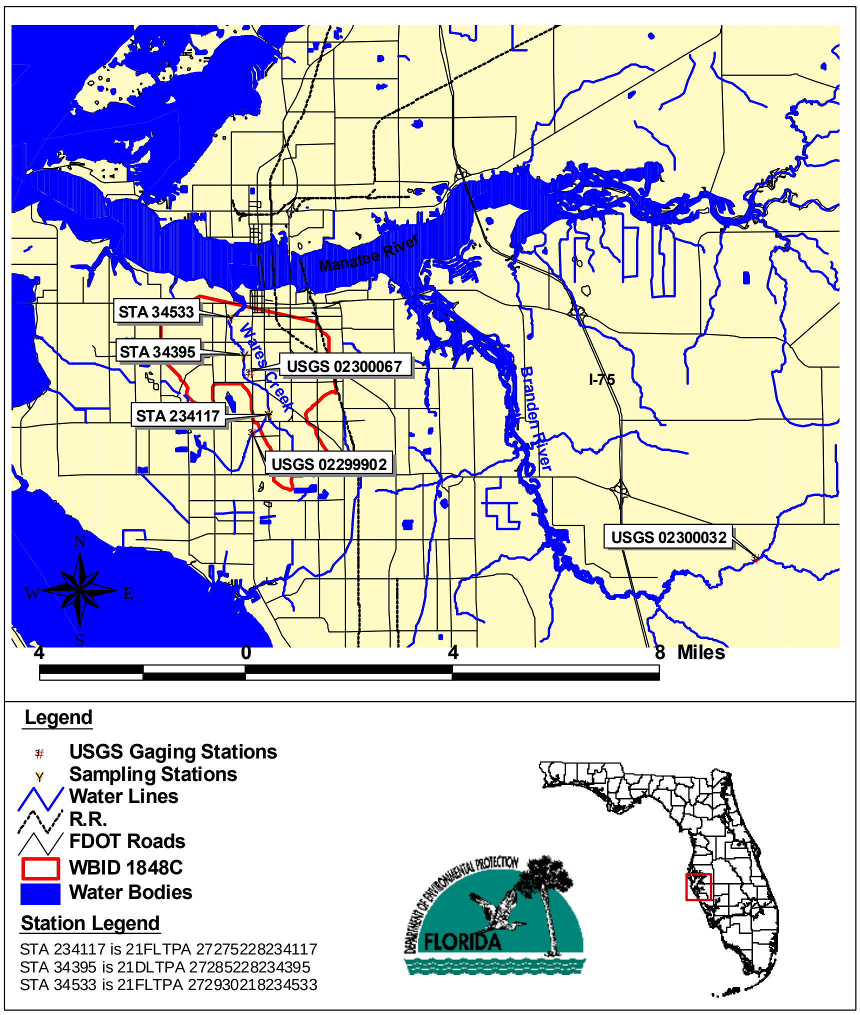
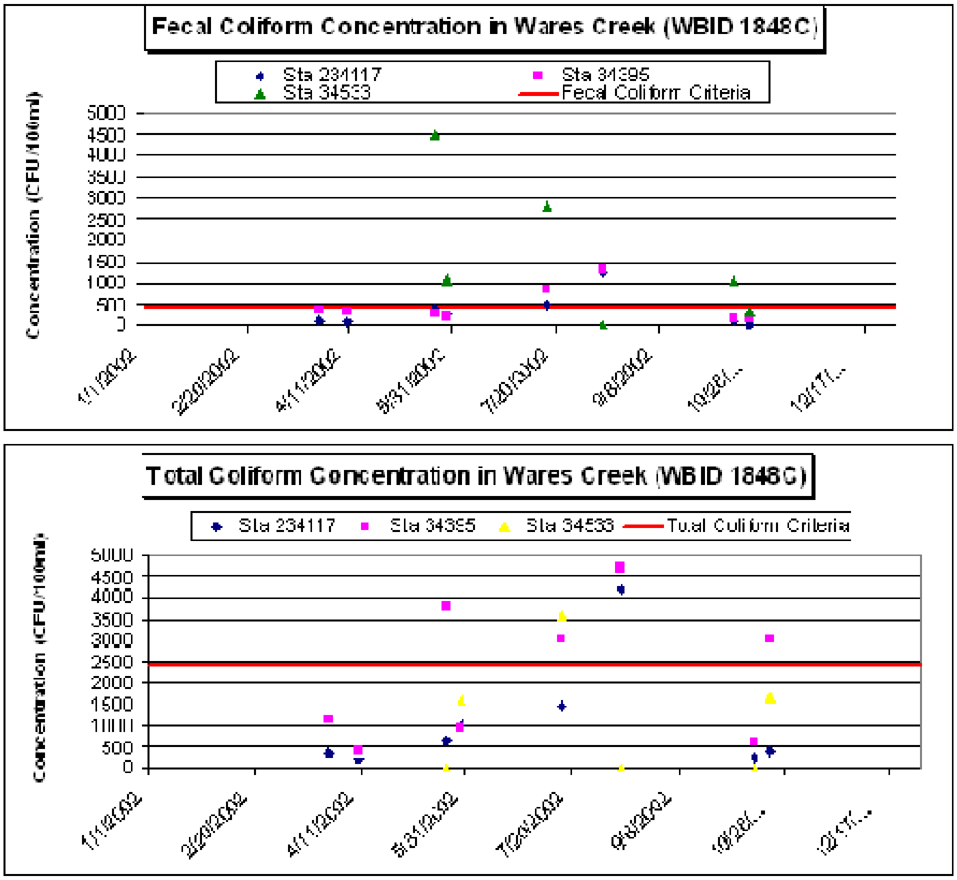


Figure 5.2. Fecal and Total Coliform Data for Wares Creek, WBID 1848C



5.3 Determination of Required Percent Reduction

A flow duration curve was developed for Wares Creek at the mouth based on flow records from the USGS gage at Braden River near Bradenton (USGS 02300032). The USGS Wares Creek miscellaneous flow site data (USGS 02300067) could not be obtained for analysis (see **Appendix H**) **(Figure 5.4).** The records from the Braden River were used because it was the only nearby USGS gage in operation during the coliform data collection. The flow for the mouth of Wares Creek on a given day was obtained by multiplying the flow on the Braden River by the ratio of drainage areas of Wares Creek and the Braden River (DA Wares/DA Braden River= 6.8 mi^2/25.8 mi^2).

Using the flows from this curve, a load duration curve for fecal coliform **(Figure 5.6)** was calculated using the following equation:

(observed daily flow in cfs) x (conversion factor 2.45E07) x (state criterion of 400 cfu) = (allowable daily load in cfu/day) (1)

The above equation yields the load duration curve or allowable load curve **(Figure 5.6).** The fecal coliform load (CFU/day) was calculated using Equation 1 (above) by substituting the state criterion with the measured value. Fecal coliform observations were then plotted, noting where the samples were in relation to the allowable load curve (above or below the curve). Those above the curve **(Figure 5.6)** are noted as exceedances to the state criterion and are indicated by pink squares.

Figure 5.4. Flow Duration Curve for Wares Creek based on Braden River USGS Gage 02300032

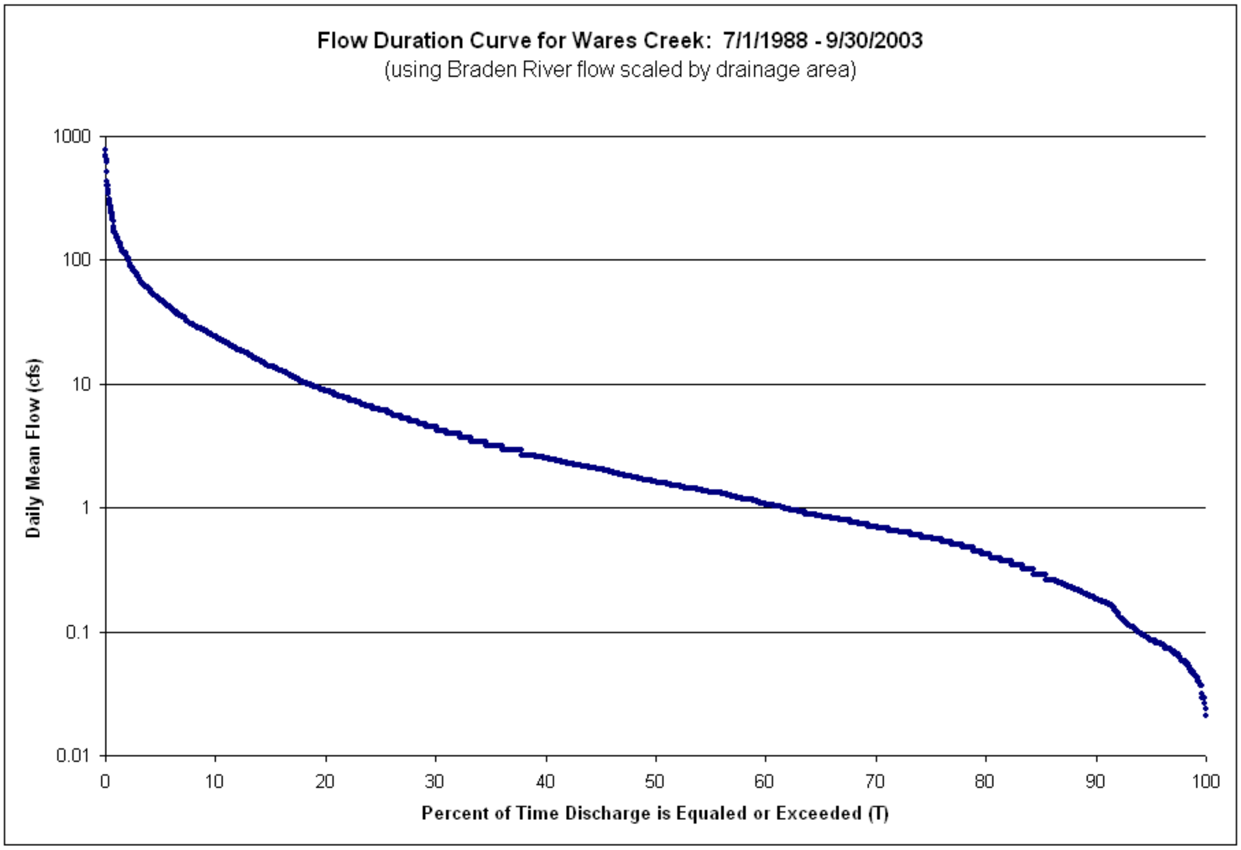


Figure 5.5. Fecal Coliform Observations and Load Duration Curve with Line-of-Best-Fit (Exponential Curve)

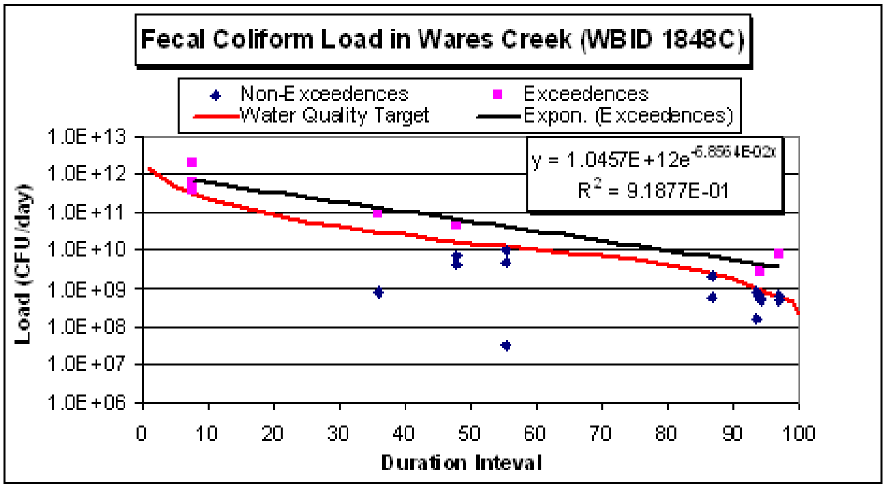


Figure 5.6. Total Coliform Observations and Load Duration Curve with Line-of-Best-Fit (Exponential Curve)

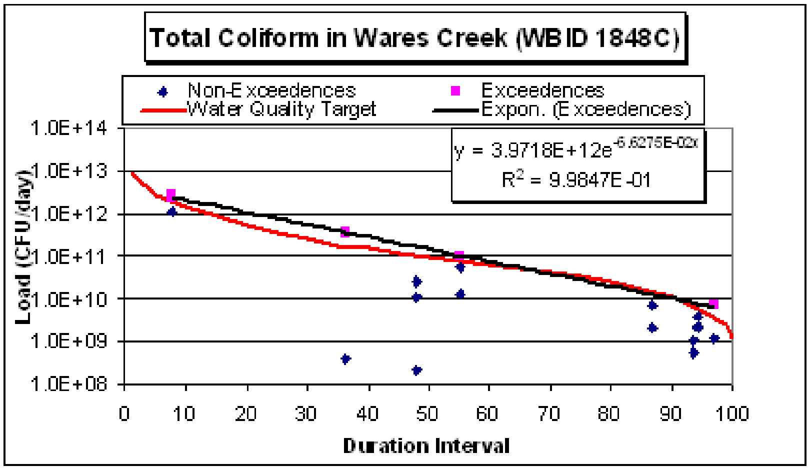


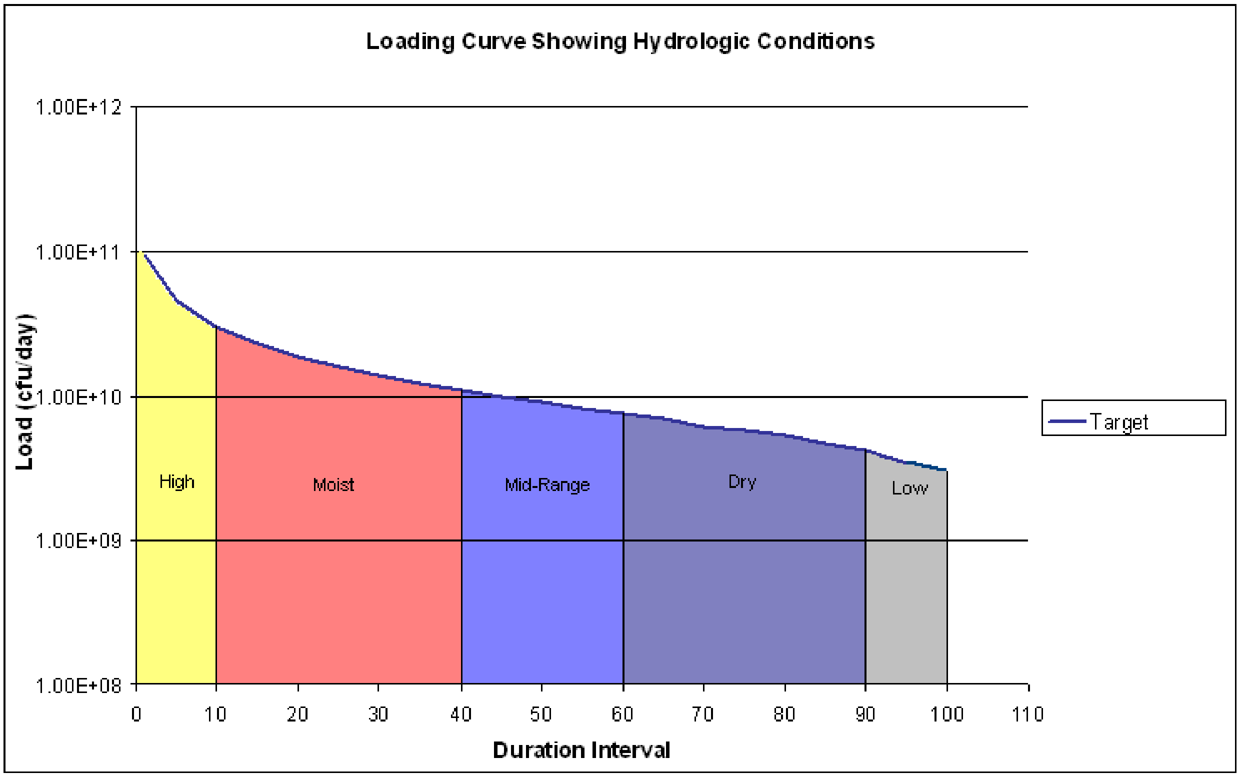
Table 5.3. Observed Data for Calculating Exceedances to the State Criterion for Wares Creek, **WBID 1848C**

Station Number	Sample Date	Flow (cfs) using Braden flow scaled by drainage area	Flow Rank (%)	Fecal Coliform (N/100mL)	FC Load (N/day)	Total Coliform (N/100mL)	TC Load (N/day)
21FLTPA 27275228234117	3/27/2002	0.5534884	75.96	90	1.22E+09	350	4.74E+09
21FLTPA 27275228234117	4/10/2002	0.110697674	93.27	60	1.62E+08	210	5.69E+08
21FLTPA 27275228234117	5/22/2002	0.07379845	96.72	370	6.68E+08	670	1.21E+09
21FLTPA 27275228234117	5/29/2002	0.09751938	94.15	250	5.96E+08	1000	2.39E+09
21FLTPA 27275228234117	7/16/2002	30.8372093	7.75	**500**	3.77E+11	1440	1.09E+12
21FLTPA 27275228234117	8/12/2002	3.162790698	35.99	**1230**	9.52E+10	**4200**	3.25E+11
21FLTPA 27275228234117	10/14/2002	1.792248062	47.77	100	4.38E+09	250	1.10E+10
21FLTPA 27275228234117	10/22/2002	1.344186047	55.14	1	3.29E+07	380	1.25E+10
21FLTPA 27285228234395	3/27/2002	0.5534884	75.96	330	4.47E+09	1140	1.54E+10
21FLTPA 27285228234395	4/10/2002	0.110697674	93.27	300	8.12E+08	390	1.06E+09

21FLTPA 27285228234395	5/22/2002	0.07379845	96.72	275	4.97E+08	**3800**	6.86E+09
21FLTPA 27285228234395	5/29/2002	0.09751938	94.15	210	5.01E+08	920	2.20E+09
21FLTPA 27285228234395	7/16/2002	30.8372093	7.75	**840**	6.34E+11	**3000**	2.26E+12
21FLTPA 27285228234395	8/12/2002	3.162790698	35.99	**1300**	1.01E+11	**4700**	3.64E+11
21FLTPA 27285228234395	10/14/2002	1.792248062	47.77	155	6.80E+09	580	2.54E+10
21FLTPA 27285228234395	10/22/2002	1.344186047	55.14	150	4.93E+09	**3000**	9.87E+10
21FLTPA 272930218234533	5/22/2002	0.07379845	96.72	**4500**	8.12E+09	1	1.81E+06
21FLTPA 272930218234533	5/29/2002	0.09751938	94.15	**1060**	2.53E+09	1580	3.77E+09
21FLTPA 272930218234533	7/16/2002	30.8372093	7.75	**2800**	2.11E+12	**3600**	2.72E+12
21FLTPA 272930218234533	8/12/2002	3.162790698	35.99	10	7.74E+08	5	3.87E+08
21FLTPA 272930218234533	10/14/2002	1.792248062	47.77	**1020**	4.47E+10	5	2.19E+08
21FLTPA 272930218234533	10/22/2002	1.344186047	55.14	310	1.02E+10	1650	5.43E+10

Values on the load duration curve can generally be grouped by hydrologic conditions to identify the most likely potential sources. Exceedances falling into the 11th through 40th percentile flows are typically associated with moist conditions when stormwater loads are the most likely source, and exceedances falling in the 61st through 90th percentiles are typically associated with dry conditions when point sources are likely the dominant source **(Figure 5.7** and **Table 5.4).** The plotted data show that most of the fecal coliform exceedances occur under moist conditions, with the exception of two exceedances at extreme drought conditions (above the 90th percentile flow). The total coliform exceedences are spread out over the entire range of flow conditions, from 7.75 % through 96.72 %.

Figure 5.7. Loading Curve Showing Hydrologic Conditions



To determine the loading capacity, a trend-line of best-fit was applied through the fecal coliform exceedances **(Figure 5.5**). The best-fitting trend line was determined by evaluating different functions until the highest R^2 value was found. In this case, an exponential function was determined to be the best fit, and took the following form:

(2) Y= (1.04575 E+12)*(EXP(-0.0585638*X)), where

Y= Fecal Coliform Load (cfu/day) and X = % duration interval

This exponential function (Equation 2) was then used to predict the existing loads by substituting different percentile numbers (10^{th} to 90^{th}, incremented by 5, see **Table 5.4,** Column 1) for x percent. The result yielded a range of predicted loads within each 5^{th} percentile of the flow record (**Table 5.4**, Column 3). The percent reduction in loading needed for compliance with the state criterion for a given 5^{th} percentile of the flow record was then calculated for each estimated load. This calculation involved both the allowable load and predicted loads previously computed (**Table 5.4**, Columns 2 and 3, respectively). Using percentile increments of 5 over the flow range with exceedances, only within the range of 10 – 50%, (see **Table 5.4),** the needed reduction of daily load was computed using the following equation:

$$\frac{\text{(predicted load)} - \text{(allowable load)} \times 100\ \%}{\text{(predicted load)}} \qquad (3)$$

The percent reduction in loading needed for compliance with the state criterion was then calculated as the median percent reduction over the range of flows where exceedances occurred (10th to 50th), which is 75.7 percent. Similarly, the loading capacity was established as the median allowable load over the range of flows where exceedances occurred, which is 4.38E10 CFU/day. For total coliform, no regression equation gave a positive percent reduction over the whole range of flow values. EPA (Davis 2004) recommended using the mid-range 40th - 60th flow range to give a 20.0% reduction. However, this number is based only on one exceedance in the flow range.

5.2.3 Critical Conditions/Seasonality

To ensure that this TMDL adequately addresses exceedances during all flow conditions, the TMDL was based on the reduction needed for the critical conditions. Based on the load duration curve, the critical conditions for Wares Creek are the moist to mid- flows, which is the range of flows when the exceedances occurred. Over these flow conditions, a 75.7 percent reduction in fecal coliform levels is needed to reach the coliform criterion of 400 cfu/100ml, and a 20.0 percent reduction in total coliform is needed.

Table 5.4. Table for Calculating Needed Reduction and Loading Capacity

% of Days FC Load Exceeded	Allowable FC Load (#colonies/day)	Predicted FC Load (#col./day)	FC Load Reduction Needed For Compliance (%)
10	2.347E+11	5.822E+11	59.69
15	1.358E+11	4.344E+11	68.74
20	8.512E+10	3.242E+11	73.74
25	5.933E+10	2.419E+11	75.47
30	4.385E+10	1.805E+11	75.70
35	3.095E+10	1.347E+11	77.01
40	2.461E+10	1.005E+11	75.51
45	1.986E+10	7.497E+10	73.51
50	1.599E+10	5.594E+10	71.41
Median:	4.38E10	1.805E11	**75.7**

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (Waste Load Allocations, or WLAs), nonpoint source loads (Load Allocations, or LAs), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$\mathbf{TMDL = \sum WLAs + \sum LAs + MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\mathbf{TMDL \cong \sum WLAs_{wastewater} + \sum WLAs_{NPDES\ Stormwater} + \sum LAs + MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (a) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (b) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as "percent reduction" because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the "maximum extent practical" through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. TMDLs for Wares Creek are expressed in terms of CFU/day, percent reduction and concentration, and represent the maximum daily fecal load the river can assimilate and maintain the fecal coliform criterion **(Table 6.1).** It should be noted that the LA is the same as the TMDL (4.38E10 CFU/day).

Table 6.1. TMDL Components for Wares Creek

WBID	Parameter	TMDL (colonies/day)	WLA	WLA	LA Percent Reduction	MOS
			Wastewater (count/100 mL)	NPDES Stormwater Permit Reduction		
1848C at mouth	Fecal Coliform	4.38E10	NA	75.7	75.7	Implicit
1848C at mouth	Total Coliform	7.89E10	NA	NA	20.0	Implicit

6.2 Load Allocation (LA)

Based on a loading duration curve approach similar to that developed by Kansas (Stiles, 2003), a fecal coliform reduction of 75.7 percent and total coliform reduction of 20.0 percent is needed from nonpoint sources. It should be noted that the LA includes loading from stormwater discharges regulated by the Department and the water management districts that are not part of the NPDES Stormwater Program (see **Appendix A**).

6.3 Wasteload Allocation (WLA)

6.3.1 NPDES Wastewater Discharges

The City of Bradenton's and Manatee County's NPDES wastewater permits are required to meet all water quality criteria as a condition of the permits, including all three components of the fecal coliform criterion. This facility, and any future discharge permits issued within or adjacent to the Wares Creek watershed, will be required to meet the state Class III criterion for fecal coliform, and therefore will not be allowed to exceed 200 counts/100 mL as a monthly average, 400 more than 10 percent of the time, or 800 counts/100 mL at any given time.

6.3.2 NPDES Stormwater Discharges

The WLA for stormwater discharges is a 75.7 percent reduction in fecal coliform loading and a 20 percent reduction in total coliform loading, which are the same percent reductions required for nonpoint sources. It should be noted that any MS4 permittee will only be responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Florida Department of Environmental Protection, February 2001), an implicit margin of safety (MOS) was used in the development of this TMDL. An implicit MOS was provided in the TMDL by not allowing any exceedances of the state criterion, even though intermittent natural exceedances of the criterion would be expected and would be taken into account when determining impairment. The TMDL also provides an implicit MOS because it does not take decay/die-off into account. In addition, 400 MPN/100 ml of fecal coliform was used as the water quality target for each and every sampling event instead of setting the criteria such that no more than 10% of the samples exceed 400 MPN/100 ml.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL, which will be a component of the Basin Management Action Plan (BMAP) for the Apalachicola–Chipola Basin. This document will be developed over the next year in cooperation with local stakeholders and will attempt to reach consensus on more detailed allocations and on how load reductions will be accomplished. The BMAP will include the following:

- Appropriate allocations among the affected parties,
- A description of the load reduction activities to be undertaken,
- Timetables for project implementation and completion,
- Funding mechanisms that may be utilized,
- Any applicable signed agreement,
- Local ordinances defining actions to be taken or prohibited,
- Local water quality standards, permits, or load limitation agreements, and
- Monitoring and follow-up measures.

TMDL development and implementation is an iterative process, and this TMDL will be re-evaluated during the BMAP development process and subsequent watershed management cycles. The Department recognizes that it may be appropriate to revise the TMDL in the future when this additional information has been collected and analyzed.

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Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, F.A.C.

The rule requires the state's water management districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a SWIM plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG has been developed for Newnans Lake at the time this study was conducted.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES stormwater permitting program to designate certain stormwater discharges as "point sources" of pollution. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific Standard Industrial Classification (SIC) codes, construction sites disturbing five or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as municipal separate storm sewer systems (MS4s). However, because the master drainage systems of most local governments in Florida are interconnected, the EPA has implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and the Florida Department of Transportation throughout the fifteen counties meeting the population criteria.

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES Program will expand the need for these permits to construction sites between one and five acres, and to local governments with as few as 10,000 people. These revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility similar to other point sources of pollution, such as domestic and industrial wastewater discharges. The Department recently accepted delegation from the EPA for the stormwater part of the NPDES Program. It should be noted that most MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

Appendix B: Summary of Land Use Loads by Category

Land use Level 1 categories were used as a basis for calculating expected source loads of fecal and total coliform. Human census data from 1990 and 2000 were used for population information, sewage and septic tank percentages and number of households. Septic tank census data were obtained from the Florida Department of Health (FDOH) Web site. Additional information on geographic septic tank distribution was obtained from Department and FDOH reports. In general, septic tank and repair lists are only available by county by year for the past 30 years. The cumulative number of tanks has not been adjusted by the number abandoned, disconnected, or dismantled. Only 1 year of data is available for this information. GIS data linking septic tanks with latitude-longitude are not yet available for each county. These data were used in a TMDL study of Lake Lafayette. The author is pursuing the link of septic tank permits (by street address) to lat-long coordinates to distribute tanks by WBIDs and other basin delineations.

Animal census data were calculated from the American Veterinary Association Web site. Livestock Census Data were obtained from the U.S. Department of Agriculture Web site.

Wildlife census data were obtained from reports by the Florida Fresh Water Fish and Wildlife Commission and Florida Department of Agriculture and Consumer Services, and from previous TMDL studies conducted by the EPA and Georgia EPD.

Below is a table of average daily loadings of fecal coliform in the Wares Creek WBID.

TABLE 4.4											
WARES CREEK WBID 1848 C FLOWS TO MANATEE RIVER											
AVERAGE DAILY LOADING OF FECAL COLIFORM FROM											
LAND USE LEVEL1			MANATEE COUNTY		REFER-	WBID	1848C		MANATEE COUNTY		
			TOTAL		ENCES	TOTAL			TOTAL		
			SQMI	%		SQMI	%		SQMI	%	
1000	URBAN AND BUILT UP		1.0517E+02	14.18485		6.5093E+00	95.26130161		1.0517E+02	1.4185E+01	
2000	AGRICULTURE		3.1377E+02	42.31914		1.0800E-02	0.158054177		3.1377E+02	4.2319E+01	
3000	RANGELAND		9.6265E+01	12.9837			0		9.6265E+01	1.2984E+01	
4000	UPLAND FORESTS		7.7208E+01	10.41338		3.1100E-02	0.455137492		7.7208E+01	1.0413E+01	
5000	WATER		2.7294E+01	3.68123		6.7000E-02	0.980521286		2.7294E+01	3.6812E+00	
6000	WETLANDS		1.1145E+02	15.03187		5.0300E-02	0.736122697		1.1145E+02	1.5032E+01	
7000	BARREN LAND		7.6800E-01	0.103584			0		7.6800E-01	1.0358E-01	
8000	TRANSPORTATION AND UTILITIES		9.5069E+00	1.28224		1.6460E-01	2.408862742		9.5069E+00	1.2822E+00	
	TOTAL LAND		7.1414E+02	96.31877		6.7661E+00	99.01947871		7.1414E+02	9.6319E+01	
	TOTAL LAND+WATER		7.4143E+02	100		6.8331E+00	100		7.4143E+02	1.0000E+02	
	TOTAL CENSUS 2000		544								
	URBAN RATIO WBID/COUNTY		1			6.1893E-02					
	AGRICULTURE RATIO WBID/COUNTY					3.4421E-05					
	NATURAL RATIO WBID/COUNTY					2.5401E-04					
	TOTAL SEPTIC TANKS THRU 2000		3.8482E+04			2.3818E+03			3.8482E+04		
	TOTAL REPAIRS THRU 2000		7.8400E+02			4.8524E+01			7.8400E+02		
	TOTAL FAILURES		7.6964E+02			4.7635E+01			7.6964E+02		
	TOTAL HOUSEHOLDS		1.3813E+05			8.5491E+03			1.3813E+05		
	TOTAL HOUSEBOATS										
	TOTAL 1990 PUBLIC SEWER		102788			6.3618E+03			102788		
	TOTAL 1990 SEPTIC		12105			7.4921E+02			12105		
	TOTAL 1990 OTHER		352			2.1786E+01			352		
	TOTAL POPULATION		2.6400E+05			1.6340E+04			2.6400E+05		
LIVESTOCK, WILDLIFE, AND DOMESTIC ANIMALS					REFER-	WBID	1848C		MANATEE COUNTY		
					ENCES				AT MOUTH		
ANIMAL TYPE	FC PRODUCED	ANIMALS	COUNTY	ANIMAL		DA1	NDA1	LFC1	DA3	NDA3	LFC3
	LFC	PER COUNTY	AREA	DENSITY							
	CTS/ANIMAL/DAY		SQMI	N/SQMI		SQMI	N	CTS/DAY	SQMI	N	CTS/DAY
			544								
LIVESTOCK											
CATTLE AND CALVES INVENTORY							2.1319E+00			61937	
CATTLE AND CALVES SOLD	1.04E+11						9.2784E-01	9.6495E+10		26956	2.8034E+15
DAIRY CATTLE INVENTORY	1.01E+11		544		C		1.6897E-01	1.7032E+10		4909	4.9483E+14
BEEF CATTLE INVENTORY	1.04E+11		544		C		1.1546E+00	1.2008E+11		33543	3.4885E+15
SHEEP AND LAMBS INVENTORY	1.20E+10		544		C		6.0236E-03	7.2283E+07		175	2.1000E+12
SHEEP AND LAMBS SOLD	1.20E+10						0.0000E+00	0.0000E+00			0.0000E+00
HORSES AND PONIES INVENTORY	4.20E+08		544		C		5.3868E-02	2.2625E+07		1565	6.5730E+11
HORSES AND PONIES SOLD	4.20E+08						6.9185E-03	2.9058E+06		201	8.4420E+10
MULES, BURROS, AND DONKEYS	4.20E+08		544		C,E		1.2391E-03	5.2044E+05		36	1.5120E+10
MULES, BURROS, AND DONKEYS	4.20E+08						0.0000E+00	0.0000E+00			0.0000E+00
LLAMAS (~SHEEP)	1.20E+10		544		C,E		2.7192E-03	3.2631E+07		79	9.4800E+11
BISON (~BEEF CATTLE)	1.04E+11		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
DEER	5.00E+08		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
ELK	5.00E+08		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
GOATS, ALL (~SHEEP) INVENTORY	1.20E+10		544		C,E		4.4747E-03	5.3696E+07		130	1.5600E+12
GOATS, ALL (~SHEEP) SOLD	1.20E+10						1.9964E-03	2.3957E+07		58	6.9600E+11
HOGS AND PIGS INVENTORY	1.08E+10		544		C		6.3334E-03	6.8400E+07		184	1.9872E+12
HOGS AND PIGS SOLD	1.08E+10						1.0085E-02	1.0892E+08		293	3.1644E+12
LAYER CHICKENS INVENTORY	1.40E+08		544		C		1.2808E-01	1.7931E+07		3721	5.2094E+11
LAYER CHICKENS SOLD	1.40E+08						0.0000E+00	0.0000E+00			0.0000E+00
BROILERS INVENTORY	1.40E+08		544		C		4.4747E-04	6.2645E+04		13	1.8200E+09
BROILERS SOLD	1.40E+08						0.0000E+00	0.0000E+00			0.0000E+00
TURKEYS INVENTORY	9.50E+07		544		C		1.5489E-03	1.4715E+05		45	4.2750E+09
TURKEYS SOLD	9.50E+07						0.0000E+00	0.0000E+00			0.0000E+00
DUCKS INVENTORY	2.50E+09		544		C		1.8587E-03	4.6468E+06		54	1.3500E+11
DUCKS SOLD	2.50E+09						0.0000E+00	0.0000E+00			0.0000E+00
GEESE INVENTORY	4.90E+10		544		C		2.0652E-04	1.0120E+07		6	2.9400E+11

GEESE SOLD	4.90E+10						0.0000E+00	0.0000E+00			0.0000E+00
EMUS (~GEESE)	4.90E+10		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
OSTRICHES (~GEESE)	4.90E+10		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
PHEASANTS (~GEESE) INVENTOR	4.90E+10		544		C,E		0.0000E+00	0.0000E+00			0.0000E+00
PHEASANTS (~GEESE) SOLD	4.90E+10						0.0000E+00	0.0000E+00			0.0000E+00
PIGEONS OR SQUAB INVENTORY	1.60E+08		544		C		0	0.0000E+00			0.0000E+00
PIGEONS OR SQUAB SOLD	1.60E+08						0	0.0000E+00			0.0000E+00
QUAIL (~PIGEON)	1.60E+08		544		C		0	0.0000E+00			0.0000E+00
OTHER			544		C		0	0.0000E+00			0.0000E+00
RABBITS INVENTORY			544		C		0	0.0000E+00			0.0000E+00
RABBITS SOLD							0	0.0000E+00			0.0000E+00
TOTAL LIVESTOCK			544		C			1.37526E+11			6.7989E+15
			544		C						
WILDLIFE			544		C						
ALLIGATORS			544		C						0.0000E+00
BLACK BEARS			544		C						0.0000E+00
RACCOONS	1.25E+08		544		C						0.0000E+00
BEAVERS	2.50E+08		544		C						0.0000E+00
DEER	5.00E+08		544	22.16	CHI		3.5279E+00	1.7639E+09		1.3889E+04	6.9444E+12
DOLPHIN, PORPOISE,MANATEE			544		C						0.0000E+00
WATERFOWL	4.90E+10		544	12.4	CHI		1.9741E+00	9.6730E+10		7.7717E+03	3.8081E+14
WILD PIGS	1.08E+10		544	15.5	CHI		2.4676E+00	2.6650E+10		9.7146E+03	1.0492E+14
			544		C						0.0000E+00
TOTAL WILDLIFE			544		C			1.25144E+11			4.9268E+14
			544		C						
DOMESTIC ANIMALS			544		C						
DOGS	5.00E+09		544	0.58*HH	F		4.9585E+03	2.4792E+13		8.0114E+04	4.0057E+14
CATS	5.00E+09		544	0.66*HH	F		5.6424E+03	2.8212E+13		9.1164E+04	4.5582E+14
HORSES AND PONIES-PETS	4.20E+08		544	0.05*HH	F		4.2746E+02	1.7953E+11		6.9064E+03	2.9007E+12
TOTAL DOMESTIC			544					5.3184E+13			8.5929E+14
			544								
SEPTIC- HUMAN IMPACTS			544								
HUMAN	2.00E+09	11057	544								0.0000E+00
SEWER LINE LEAKS	6.89E+09		544					2.6264E+12			4.2435E+13
HOUSEBOATS-NONMARINA	2.00E+09		544		C						0.0000E+00
BOATS-MARINA SLIPS	2.00E+09		544								0.0000E+00
SEPTIC TANKS FAILED	6.89E+09		544				4.7635E+01	3.2816E+11		7.6964E+02	5.3020E+12
SEPTIC TANKS NORMAL			544								0.0000E+00
SEPTIC TANKS -ATU	2.76E+08		544								0.0000E+00
TOTAL SEPTIC			544					2.9546E+12			4.7737E+13
AQUACULTURE											
FISH FARMS											0.0000E+00
OYSTER HOUSES											0.0000E+00
TOTAL AQUACULTURE											0.0000E+00
TOTAL								5.6401E+13			8.1986E+15
REFERENCES											
A	USDA 2002 CENSUS, NOTE A-D INDICATES CONFIDENTIAL DATA NOT AVAILABLE AT										
B	ASSUME 1 ANIMAL PER HOUSEHOLD* 7180 HOUSING UNITS=7180										
C	EPA, 2001. PROTOCOL FOR DEVELOPING PATHOGEN TMDLS EPA 841-R-00-002										
D	ASAE, 1998. HTTP://ASAE.ORG										
E	ESTIMATED FROM SIMILAR ANIMALS										
F	WWW.AVMA.ORG VETERINARY STATISTICS 2002 US PET OWNERSHIP- DOGS=0.58*HOUSEHOLDS, CATS=0.66*HH, HORSES=0.05*HH										
G	SPEAS, 2004 RANGE OF 500 CFU-1900 CFU/100 ML OR 96% REMOVAL, USE ONE ATU=0.04*6.89E09 CFU/DAY										
H	WWW.EPA.GOV/REGION1/ASSISTANCE/CEITTS/WASTEWATER/TECHS/DELTA.HTML										
I	SHIELDS, 2001. ANNUAL REEVALUATION OF APALACHICOLA BAY HARVESTING AREA #16										
J											
K											

Appendix C: Summary of Permitted Point Sources

Little Manatee River Domestic Facilities				
Facility	Permit Number	Disposal Method	Permitted Flow (mgd)	Comments
Chula Vista Mobile Home Park Wastewater Treatment Plant	FLA012210	LA	0.0250	
Hide-A-Way Campground	FLA012133	LA	0.0300	
Hillsborough County Rest Area I-75N	FLA012609	LA	0.0400	
Little Manatee Isles Mobil Home Park	FLA012203	LA	0.0300	
Little Manatee River Mobil Home Park	FLA012170	LA	0.0400	
Neptune Mv	FLA012260	LA	0.0265	
River Oaks Rv Resort	FLA012231	LA	0.0100	
Riverside Club Wastewater Treatment Plant	FLA012169	LA	0.0600	
Tampa South RV Resort	FLA012264	LA	0.0121	
Little Manatee River Industrial Facilities				
Diggers Concrete, Inc.	FLA012340	N	Report	
Imc Phosphates Co. - Four Corners Mine	FL0036412	SW	Report	
Jh Williams Oil Company - Chevron/Hardees	FLA178781	N	Report	
Rainbow Car Wash	FLA181404	N	Report	
Tomatoes of Ruskin, Inc.	FLA177351	N	Report	
Manatee River Domestic Facilities				
City of Bradenton WWTP	FL0021369	LA/SW	6.0000	
Florida Power & Light Manatee Wastewater Treatment Plant	FLA012625	LA	0.0050	

Lake Manatee Recreation Area Wastewater Treatment Plant	FLA012654	LA	0.0050	
Manatee County Southeast Regional Wastewater Treatment Plant	FLA012618	LA	5.4000	
Winggate Creek Mine Wastewater Treatment Plant	FLA012622	LA	0.0050	
Manatee River Industrial Facilities				
F.P.L. Manatee Service Garage	FLA017060	N	Report	
Florida Power & Lihgt Co. - Manatee Plant	FL0032174	LA/SW	Report	
Miami Valley Concrete Co. - Ellenton Plant	FL0126411	SW	Report	
Nu-Gulf Industries, Inc. - Wingate Creek Mine	FL0032522	LA/SW	Report	
Singeltary - Ellenton - 17th St. East	FLA012642	N	Report	
SMR Aggregates, Inc. (fka Quality Aggregates, Inc.)	FL0043354	SW	Report	
Taylor & Fulton Packing House	FLA177920	N	Report	
Tropicana Products, Inc.	FL0000043	SW	0.8000	
West Coast Tomato, Inc.	FLA012644	N	Report	

Appendix D; Summary of Measured External Loads and Decay Rates

EXTERNAL LOADS TO TIDAL RIVER									
FROM									
WBID	NAME	WBID	NAME						
		1848C	WARES CREEK						
		LENGTH	LENGTH	WIDTH	DEPTH	DEPTH	LONGITUDE		
					HW	MOUTH	AREA		
		L	L	WIDTH	DHW	DM	DELTAVL		
		MI	FT	FT	FT	FT	FT**2		
1848A	MANATEE R BL DAM	1	5280	100	1	5	2640		
		TRANS	HORIZ	TIDAL	TIDAL	TIDAL	TIDAL	TIDAL	TIDAL
		AREA	AREA	PERIOD	PERIOD	RANGE	FLOOD	PRISM	FLOW
		AVT	AH	TFL	TFL	DELTH	DELTH/2	DELTV	QFL
		FT**2	FT**2	HRS	SEC	FT	FT	FT**3	CFS
			528000	12	43200	2	1	264000	6.111111
		FECAL	DATA	N	YEARS	TOTAL	DATA	N	YEARS
		COLIFORM	SOURCE			COLIFORM	SOURCE		
		CFCFL				CTCFL			
		CFU/100 ML				CFU/100 ML			
		226.27	A	31	1980-1987	873.2	A	31	1980-1991
		FECAL	TOTAL						
		COLIFORM	COLIFORM						
		CFCFL	CTCFL						
		CFU/DAY	CFU/DAY						
		3.38E+10	1.31E+11						
DATA SOURCE									
A	IWR RUN 16.3 JULY 09, 2004, MEAN OF SEASONAL MEANS								
B									

Appendix E: Summary of Effluent Data

Permit Number	Facility Name	District	Facility Type	Major	Monitoring Period End Date	Outfall Indicator	Parameter Code	Parameter Description
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jan-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jan-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	28-Feb-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	28-Feb-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Mar-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Mar-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Apr-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Apr-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-May-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-May-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Jun-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Jun-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jul-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jul-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Aug-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Aug-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Sep-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Sep-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Oct-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Oct-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Nov-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Nov-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Dec-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Dec-03	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jan-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Jan-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	29-Feb-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	29-Feb-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Mar-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	31-Mar-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Apr-04	001-1	P 50050	FLOW
FL0000043	TROPICANA NORTH AMERICA	TA	I	M	30-Apr-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	28-Feb-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	28-Feb-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	28-Feb-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	28-Feb-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-May-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-May-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-May-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-May-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Jun-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Jun-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Jun-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Jun-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jul-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jul-03	001-1	P 50050	FLOW

FL0021369	BRADENTON WTP	TA	M	M	31-Jul-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jul-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Aug-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Aug-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Aug-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Aug-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Sep-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Sep-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Sep-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Sep-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Oct-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Oct-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Oct-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Oct-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Nov-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Nov-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Nov-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Nov-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Dec-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Dec-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Dec-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Dec-03	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Jan-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	29-Feb-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	29-Feb-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	29-Feb-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	29-Feb-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	31-Mar-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-04	001-1	P 50050	FLOW
FL0021369	BRADENTON WTP	TA	M	M	30-Apr-04	001-1	P 50050	FLOW

Permit Number	Facility Name	Monitoring Location Code	Limit Start Date	Limit End Date	Data	Limit	Stat Base	Units	No Data Indicator
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04	1.352	REPORT ONLY	MO AVG	MGD	
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04	1.803	REPORT ONLY	MAXIMUM	MGD	
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C

FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MAXIMUM	MGD	C
FL0000043	TROPICANA NORTH AMERICA	1	01-Jul-99	30-Jun-04		REPORT ONLY	MO AVG	MGD	C
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	6.3288	9.0	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	7.1964	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.3625			MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	6.6405	6.0	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.8940	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	6.3811	9.0	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.3872			MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.4118	6.0	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.7897	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	5.6511	9.0	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.3746	6.0	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.4325			MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.3235	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.6654	9.0	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	3.6980	6.0	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	4.4321			MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.4503	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	R	01-Dec-97	30-Nov-02	4.5233	9.0	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	3.9583	6.0	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Nov-01	30-Nov-02	5.1395			MGD	
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	7.1	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	6.5	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	8.0	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08	7.1	6	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	6.25	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	6.4	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	6.8	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08	6.7	6	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	8.52	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	8.1	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	9.6	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08	7.3	6	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	7.40	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	5.6	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	9.5	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08	7.3	6	ANNL AVG	MGD	
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.93	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	8.2	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	5.5	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.17	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	6.6	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	4.7	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.17	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	5.0	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	4.8	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.21	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	4.8	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	4.8	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	5.29	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	5.1	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	5.6	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9

FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.97	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	5.4	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	5.7	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9
FL0021369	BRADENTON WTP	1	01-Jun-03	31-May-08	4.49	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	P	01-Jun-03	31-May-08	5.6	9	QTR ROLL	MGD	
FL0021369	BRADENTON WTP	Q	01-Jun-03	31-May-08	5.4	REPORT ONLY	MO AVG	MGD	
FL0021369	BRADENTON WTP	Y	01-Jun-03	31-May-08		6	ANNL AVG	MGD	9

Appendix F: Historical Summary of Wares Creek Data

Historical data collected in the Wares Creek watershed are summarized below.

Station Number	Data Provider	Date	Fecal Coliform (N/100mL)	Total Coliform (N/100mL)
21FLTPA 27275228234117	FDEP	3/27/2002	90	350
21FLTPA 27275228234117	FDEP	4/10/2002	60	210
21FLTPA 27275228234117	FDEP	5/22/2002	370	670
21FLTPA 27275228234117	FDEP	5/29/2002	250	1000
21FLTPA 27275228234117	FDEP	7/16/2002	**500**	1440
21FLTPA 27275228234117	FDEP	8/12/2002	**1230**	**4200**
21FLTPA 27275228234117	FDEP	10/14/2002	100	250
21FLTPA 27275228234117	FDEP	10/22/2002	1	380
21FLTPA 27285228234395	FDEP	3/27/2002	330	1140
21FLTPA 27285228234395	FDEP	4/10/2002	300	390
21FLTPA 27285228234395	FDEP	5/22/2002	275	**3800**
21FLTPA 27285228234395	FDEP	5/29/2002	210	920
21FLTPA 27285228234395	FDEP	7/16/2002	**840**	**3000**
21FLTPA 27285228234395	FDEP	8/12/2002	**1300**	**4700**
21FLTPA 27285228234395	FDEP	10/14/2002	155	580
21FLTPA 27285228234395	FDEP	10/22/2002	150	**3000**
21FLTPA 272930218234533	FDEP	5/22/2002	**4500**	1
21FLTPA 272930218234533	FDEP	5/29/2002	**1060**	1580
21FLTPA 272930218234533	FDEP	7/16/2002	**2800**	**3600**
21FLTPA 272930218234533	FDEP	8/12/2002	10	5
21FLTPA 272930218234533	FDEP	10/14/2002	**1020**	5
21FLTPA 272930218234533	FDEP	10/22/2002	310	1650

Note: Numbers in **bold** exceed the criteria (400 N/100mL for Fecal Coliform, 2400 N/100mL for Total Coliform).

Appendix G: USGS Gage and Flow Data

A statistical summary of flow data collected in the Wares Creek watershed is presented below.

USGS 02300032: Braden River near Lorraine, FL

Statistics

Minimum:	0.021
Maximum:	772.248
Mean:	10.888
Range of data:	7/1/1988 – 9/30/2003

Appendix H: Ground Water Data

A table of groundwater monitoring statistics is presented below.

GENERATING STATISTICS				
NETWORK:	ALL			
WATER RESOURCE:	CONFINED UNCONFINED			
WATERBODY TYPE:	ALL			
HUC:	MANATEE RIVER			
COUNTY:	MANATEE			
COLLECTION DATE:	FROM: 1-JAN-1980 TO: 8-JUL-2004			
RESULTS:	MAX PER WELL			
Parameter Name	Coliform, Fecal (MF)	Coliform, Total (MF)	Enterococci, Membrane Filter	Escherichia coli, Membrane Filter
Parameter Code	31616	31501	31649	31648
Units	#/100ml	#/100ml	#/100ml	#/100ml
Total Wells	**5**	**4**	**4**	**4**
Total Samples	**5**	**4**	**4**	**4**
Number BDLs	**5**	**4**	**4**	**4**
Number MCL/GCL Exceedances	**NA**	**0**	**NA**	**NA**
Percent MCL/GCL Exceedances	**NA**	**0%**	**NA**	**NA**
Minimum	**0**	**0**	**0**	**0**
1st Quartile	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**
3rd Quartile	**0**	**0**	**0**	**0**
Maximum	**0.5**	**0**	**0**	**0**
Interquartile Range	**0**	**0**	**0**	**0**
Mean	**0.1**	**0**	**0**	**0**
Standard Deviation	**0.224**	**0**	**0**	**0**
Relative Standard Deviation	**224%**	**0%**	**0%**	**0%**
Standard Error	**0.1**	**0**	**0**	**0**
Variance	**0.05**	**0**	**0**	**0**
Coefficient of Skewness	**1339.286**	**0**	**0**	**0**
Number Risk Indicators	**0**	**NA**	**0**	**0**
Percent Risk Indicators	**0%**	**NA**	**0%**	**0%**
Number SRA Indicators	**0**	**0**	**0**	**0**
Percent SRA Indicators	**0%**	**0%**	**0%**	**0%**

Appendix I: Public Comments and Responses

The only public comments received were dated August 26, 2004, from Mr. Seth Kohn, P.E., who is with the City of Bradenton. A copy of the comments is attached.

Mr. Kevin Petrus and Richard Wieckowicz (FDEP, WAS) had a teleconference with Mr. Kohn on Sept. 21, 2004, to discuss his comments and answer any additional questions he may have regarding the TMDL. These are listed below.

1. The drainage basin we used for Wares Creek was based on the WBID polygons in the FDEP database with an acknowledgement that the 1994 Corps of Engineers study was also consulted for a description of the hydrology. We did not attempt to differentiate between Bradenton city limits and the county regarding the drainage area or land uses.

2. We concur with the population of Manatee County (about 265000). The correct number was used in Section 4.2.2 of the report. The Bradenton population will be corrected in the text.

3. Data are included in both Table 2.2 and Appendix F. We have used the data as reported in the IWR database, without value judgements as to consistency between ratios of fecal to total coliforms, since they are run as separate tests.

4. Text will be added to note that Manatee County also operates an NPDES MS4 system.

5. We have only listed potential coliform sources consistent with other reports. More detailed sampling will be needed to actually trace some of the pollutant sources. Mr. Kohn stated that additional (and more detailed) sampling is being planned shortly. We have not tried to model any of the physical and chemical removal mechanisms for coliform bacteria, but have noted them.

6. EPA did not have the latest FDEP database in their initial analysis. An additional data set from 2003 was included in final calculations. These new data had little effect on the final answer.

7. The flow correlation calculation by EPA does not depend on the order of the stream, although there is a reference to drainage basin sizes. The TMDL report did not look at hydrology details for the basin because of lack of time, resources, and historical documents. When newer flow data are collected, they can be incorporated in revised TMDL loads.

8. Detailed analysis of individual sampling events was not performed. No attempt was made to distinguish between groundwater and surface water flows.

9. In some cases, the WBID boundary does not correspond exactly to the watershed boundary. However, the data for this TMDL appeared to have been collected within both boundaries. We are amenable to a more exact definition of the watershed.

10. Again, the TMDL was not specific as to area of responsibility between city and county.

11. There is no section 5.3. However, in section 5.2.3, we used the 10th to 50th percentile of flows. Realizing that this dataset is very limited, we cannot eliminate other flow ranges. We agree that Wares Creek should have an independent set of flow measurements so that flow can be correlated with a nearby historical gage, not necessarily the Braden River. We welcome any studies of more data collection for coliform and flow within this basin and adjacent basins in the Manatee Watershed.

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